



Gastric Motility

**Prof. Dr/ Ibrahim Mohamady
Ibrahim**



INTENDED LEARNING OBJECTIVES (ILOs)



By the end of this lecture the student will be able to:

1. Mention motor functions of the stomach.
2. Describe receptive relaxation of stomach.
3. Describe the mixing and propulsive function of the stomach.
4. Explain regulation of gastric evacuation.
5. Describe mechanism of vomiting.
6. Mention causes and effects of vomiting.



Lecture Plan

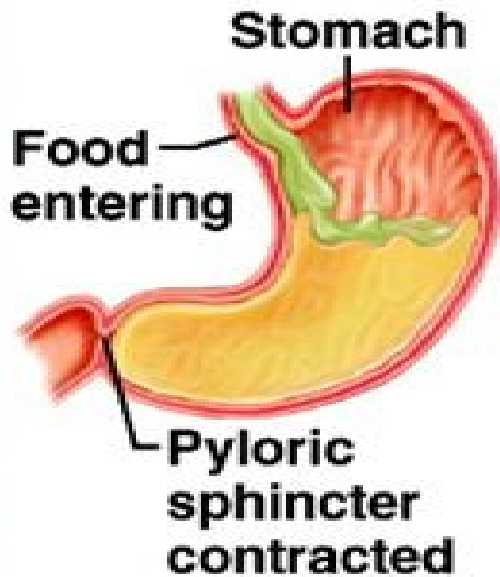


1. Part 1 (5 min) Introduction
2. Part 2 (35 min) Main lecture
3. Part 3 (5 min) Summary
4. Lecture Quiz (5 min)

Introduction

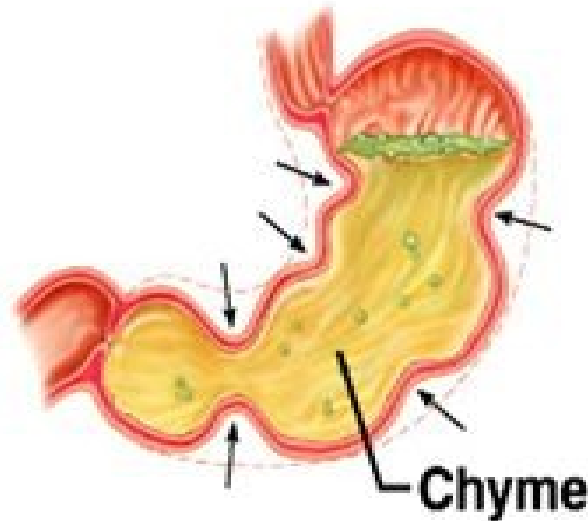


- The motor functions of the stomach include:



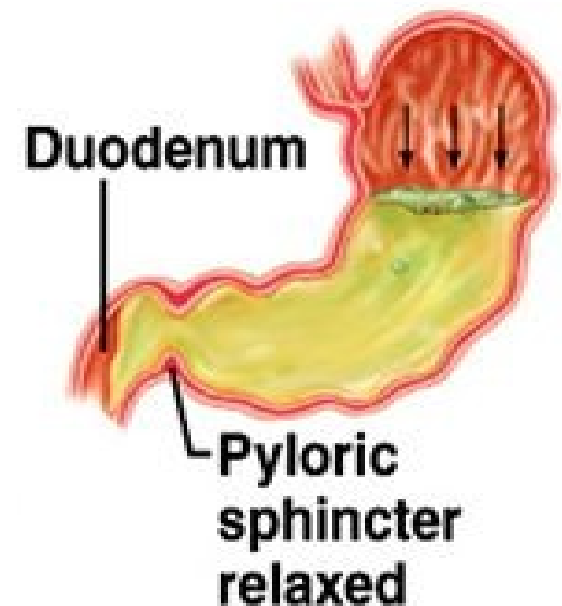
Storage of food

New Five Year Program



Mixing and partial digestion of food to form chyme

Foundation of Medical Cadet Module



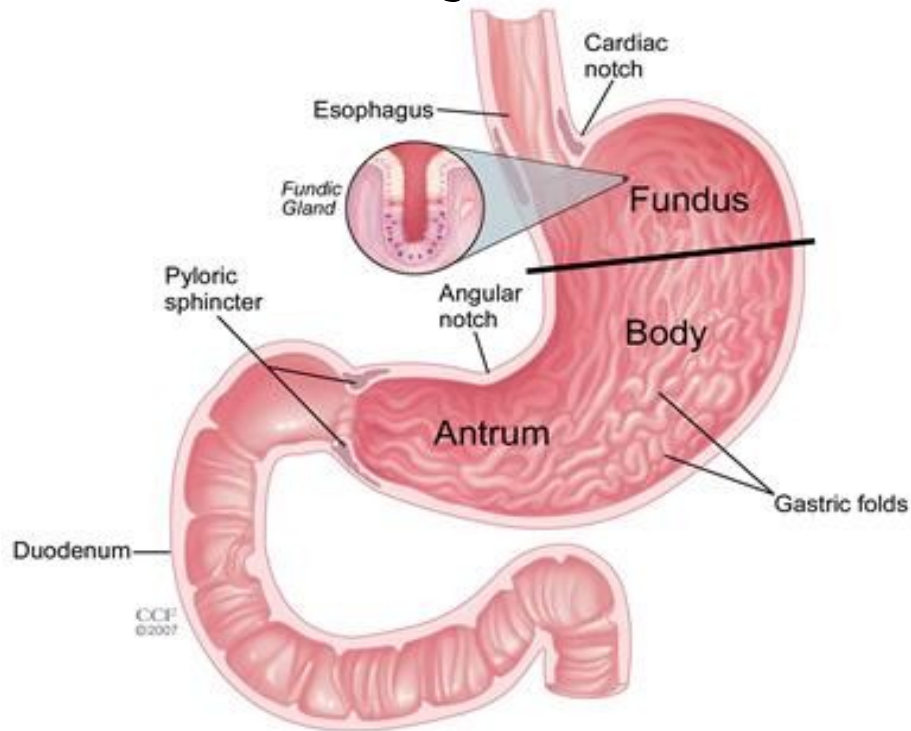
Slow emptying of the chyme into the duodenum



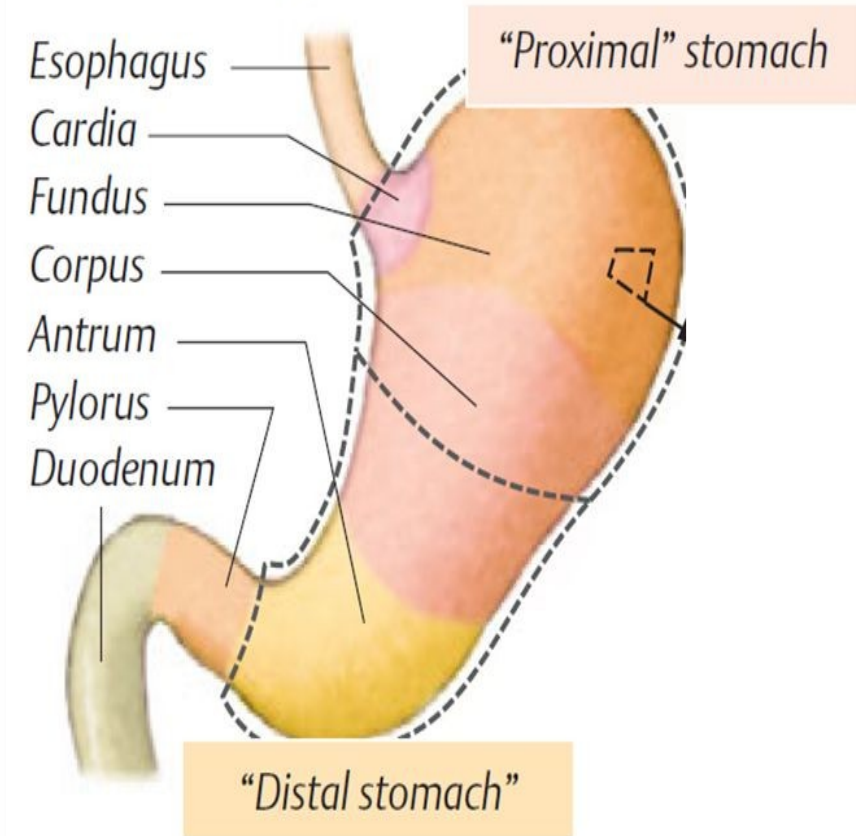
Introduction



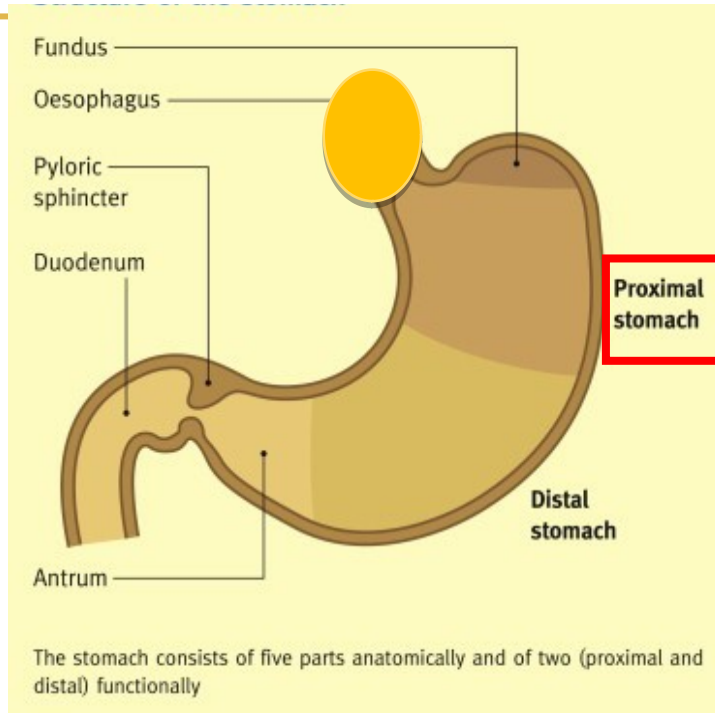
Anatomically



Physiologically



Storage Function of the Stomach-Receptive Relaxation



**Empty
stomach**

50 ml

**Pressure
in the
proximal
motor unit**

**Intra-
abdominal
pressure**

Reflex relaxation of the stomach → Increase its capacity for food

**1-1.5
liters**

**Receptive
relaxation**

**vagovagal reflex
(afferent and efferent vagal)**

**movement of pharynx and esophagus
during swallowing**



Which of the following abolishes “receptive relaxation” of the stomach?

- (A) Parasympathetic stimulation
- (B) Sympathetic stimulation
- (C) Vagotomy
- (D) Administration of gastrin
- (E) Administration of vasoactive intestinal Peptide (VIP)
- (F) Administration of cholecystokinin (CCK)

Which of the following abolishes “receptive relaxation” of the stomach?

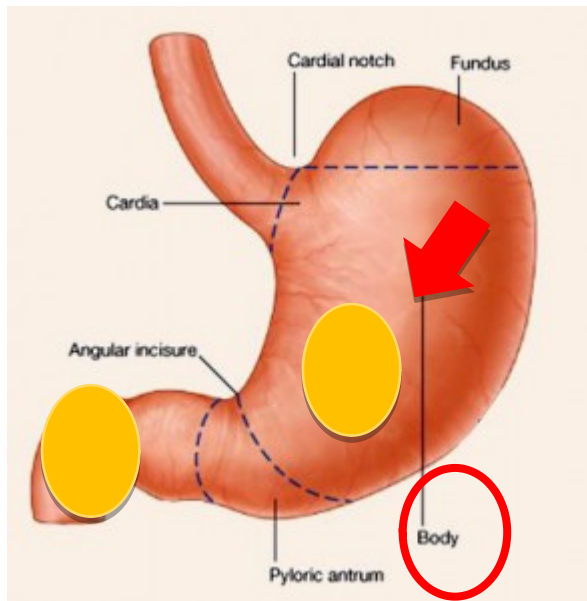
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Mixing and Propulsion of Food in the Stomach

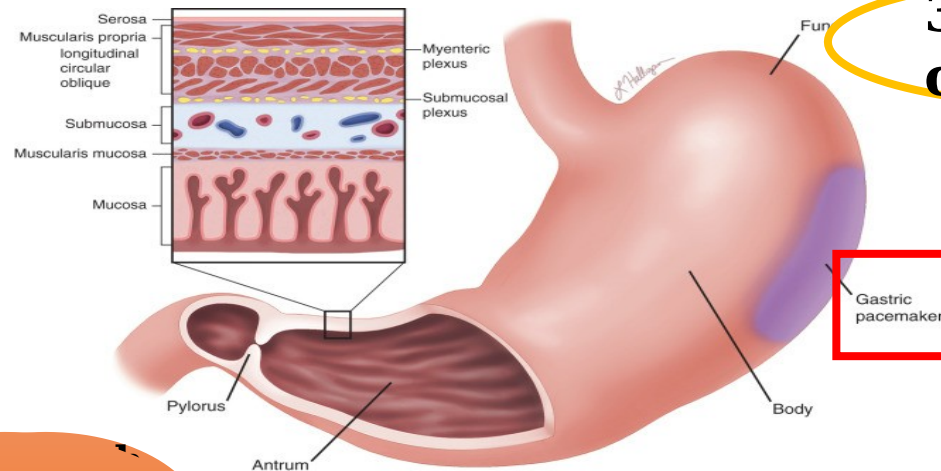


Basic Electrical Rhythm" (BER) "Gastric Slow Waves"

3-5
cycles/min



Retropulsion



Parasympat
hetic
stimulation

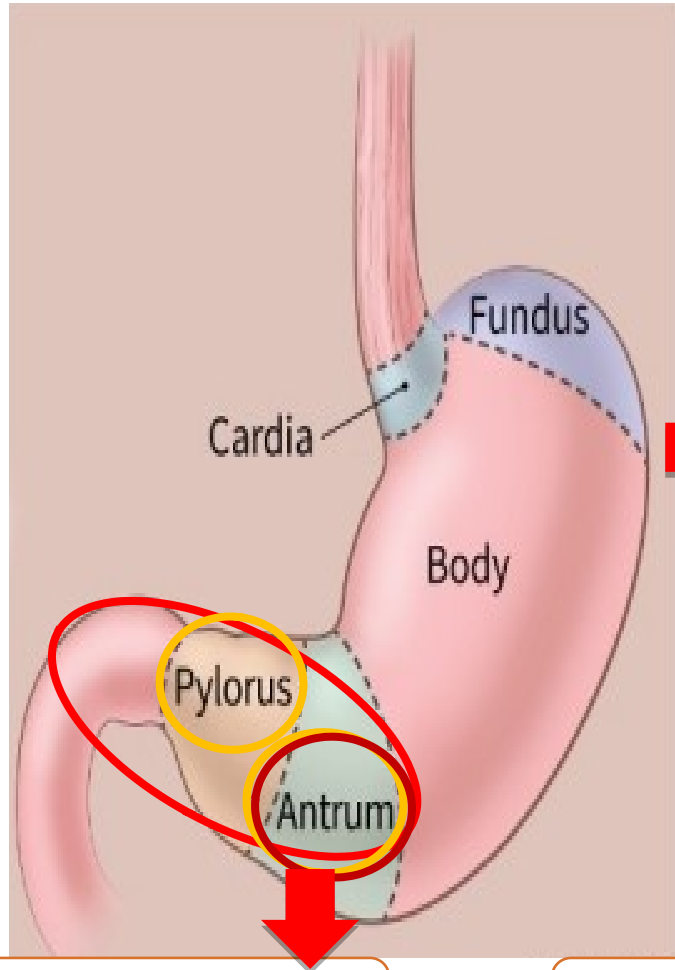


Gastrin
hormone

Increase
frequency of
action
potentials and
the force of
contractions



Gastric Emptying



Function as a unit

regurgitation from the duodenum does not occur because of:

because contraction of the pyloric segment tends to persist longer after the start of relaxation of duodenum

stimulating action of cholecystinin (CCK) and secretin on the pyloric sphincter

Partial contraction

Prevents solid masses from entering duodenum

Mixed and crushed

More liquid contents are squirted into small intestine



Regulation of Gastric Evacuation



Gastric factors

Intestinal factors

Consistency of food

Reflexes from outside the GIT

1. Gastric factors

Distension of the stomach wall



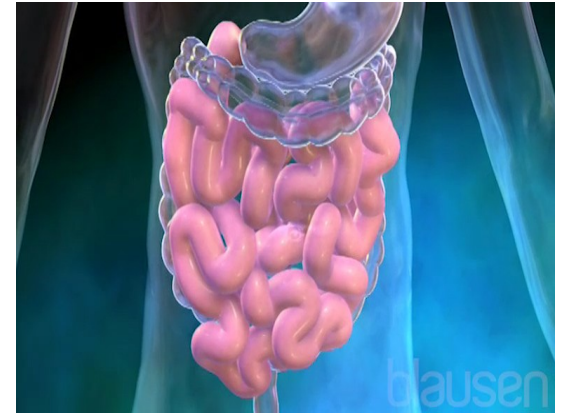
gastrin hormone release



increases stomach emptying by increasing the pyloric pumping force



Regulation of Gastric Evacuation



2. Intestinal factors

**Nervous
enterogas
tric reflex**

**Increased
acidity**

Irritation

Distension

Hypertonicity

**Fats and
protein**

Hormonal

**fat in
duodenum**

**releases some GIT
hormones (CCK, GIP and
secretin) from duodenal
mucosa**

**Inhibition of the pyloric pump
and emptying, with closure of**



Regulation of Gastric Evacuation



3. Consistency of food

Liquid food evacuation

Solid food evacuation

Isotonic contents

Hypotonic or hypertonic contents

4. Reflexes from outside the GIT

Pain



reflex inhibition of gastric motility

Emotions



13

gastric motility



Abnormality in Gastric Motility



1-Hunger contractions (Hunger pains)

Associated with hunger and fasting



Hypoglycemia



**Increases activity of
the feeding centre**



sends impulses to:

**Limbic cortex giving
the hunger
sensation**

**Vagal nucleus in the
medulla**



Abnormality in Gastric Motility

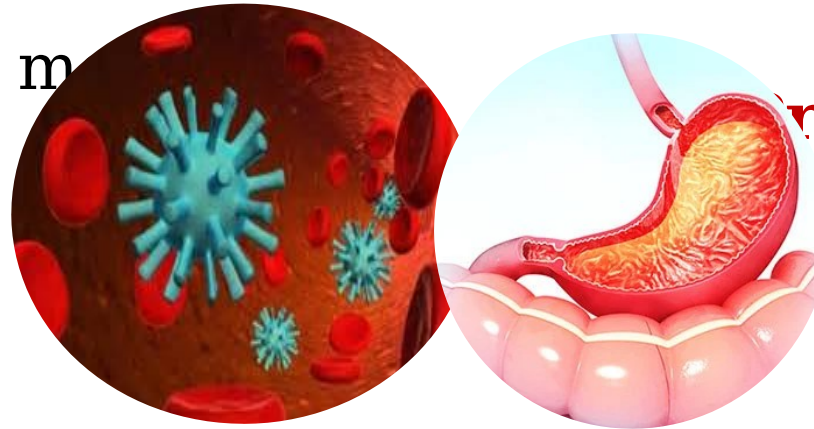
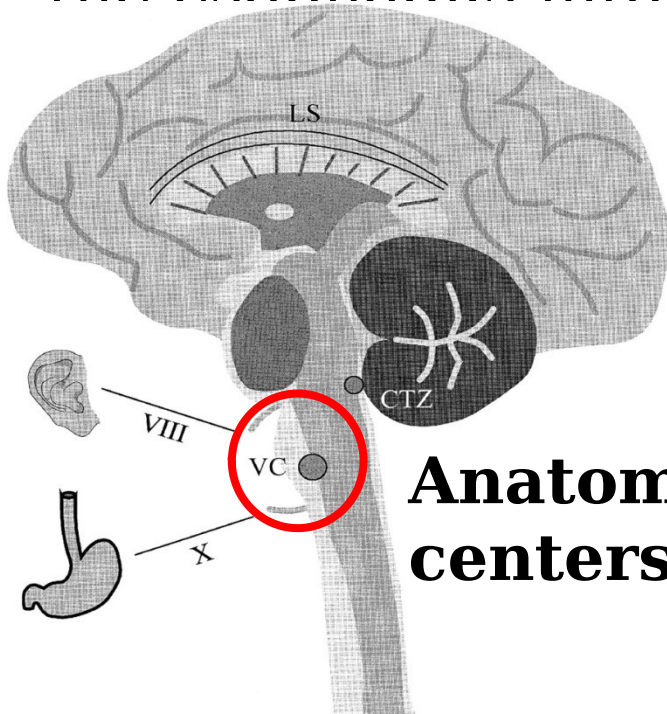


2- vomiting

- It is outward expulsion of the gastric contents through the esophagus into the mouth.



Protective mechanism



Anatomically and functionally associated with the centers of respiration.



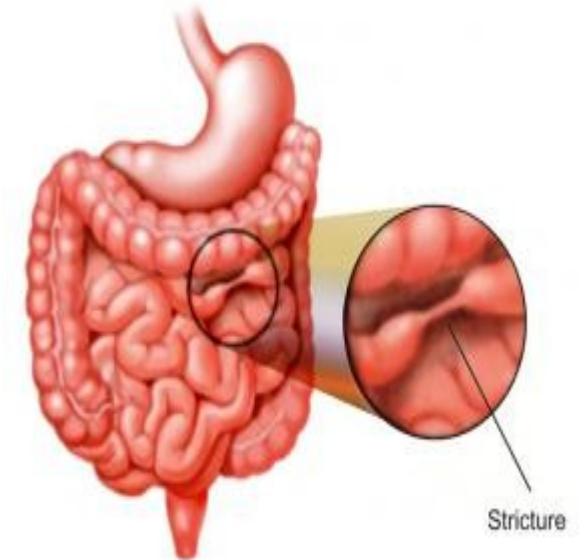
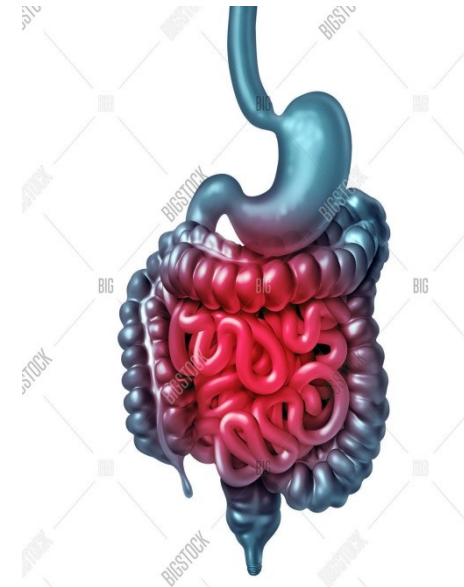
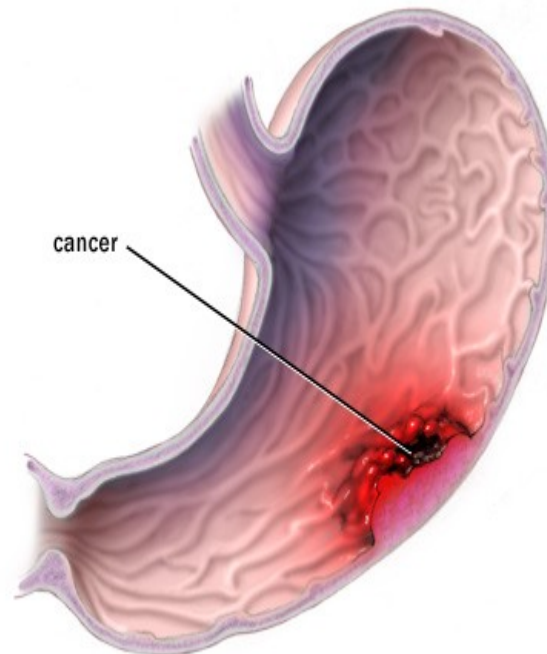
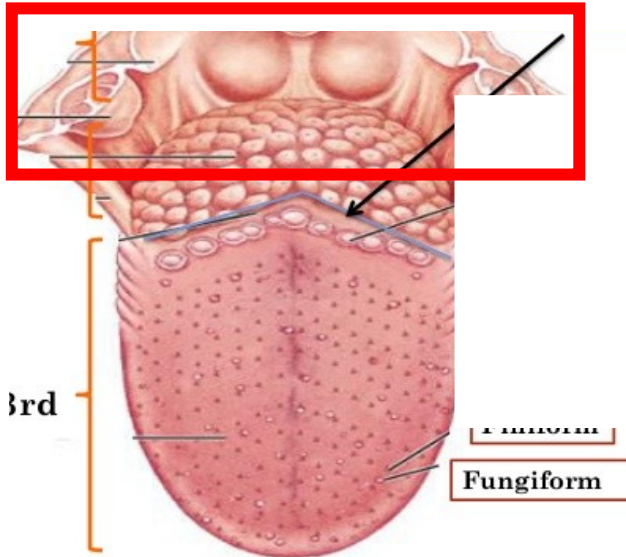
Causes of vomiting



Reflex

Central

**Reflex
vomiting**



**Mechanical stimulation
of the posterior part of
the tongue.**

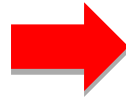
**Irritation of the gastric
mucosa.**

Intestinal obstruction or irritation

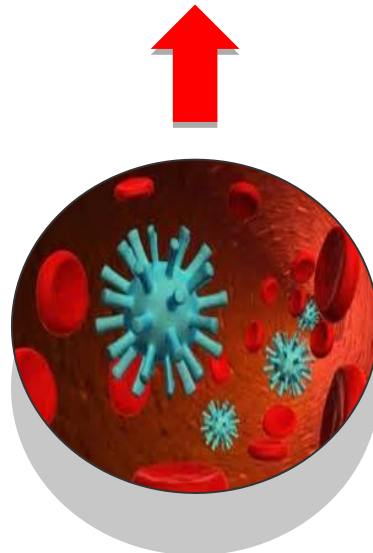
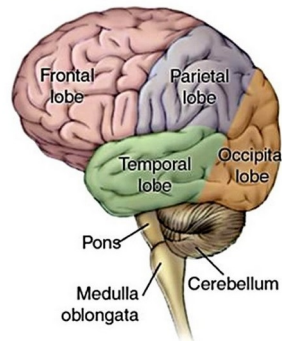
Causes of vomiting



Central vomiting



Anatomy of the Brain



**Stimulation of
the
chemoreceptor
trigger zone**



**Early
pregnancy
Diabetic
ketoacidosis
Uremia**

Mechanism of Vomiting



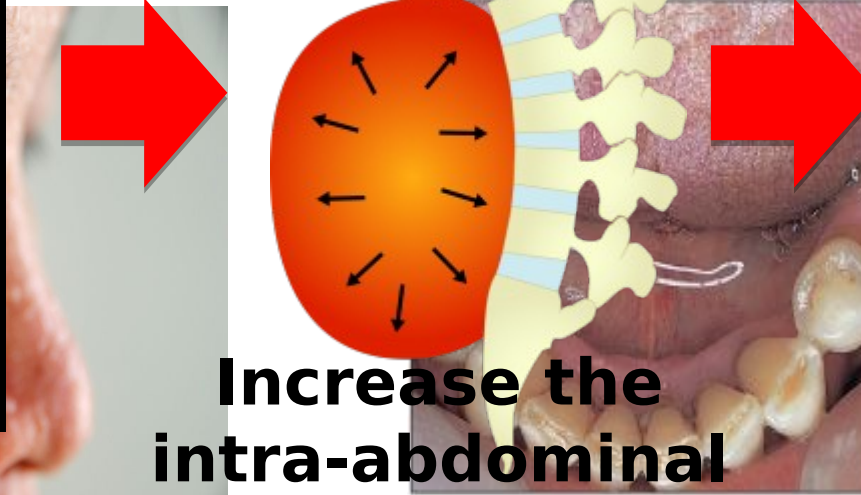
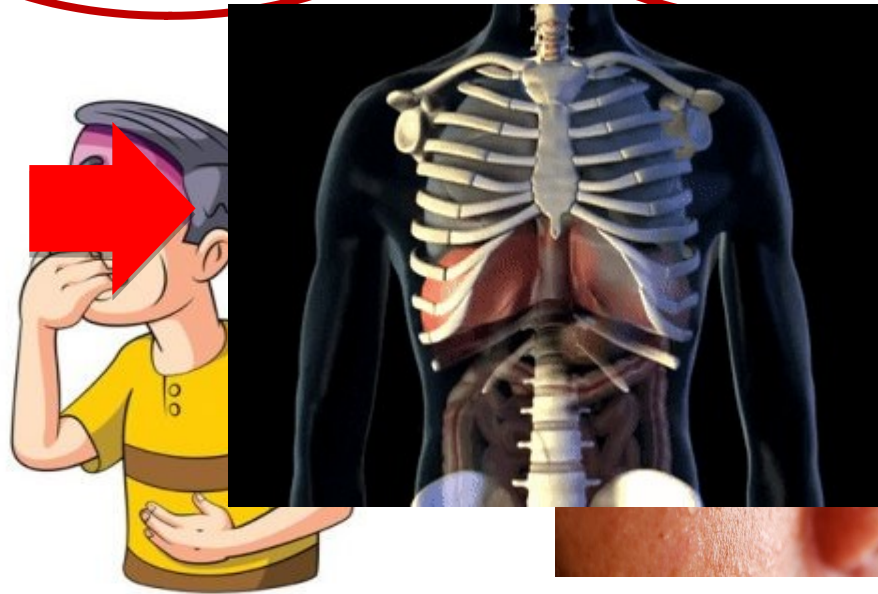
Preceding the vomiting:

nausea

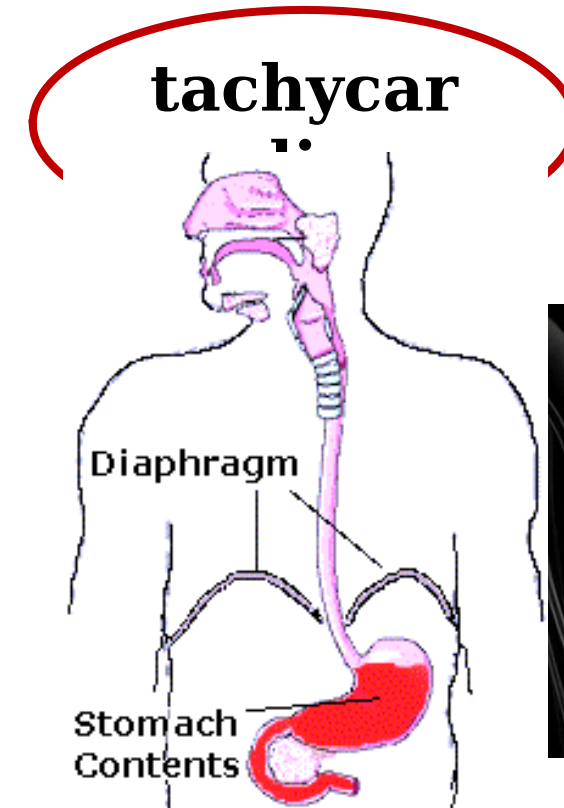
sweating

salivation

tachycardia



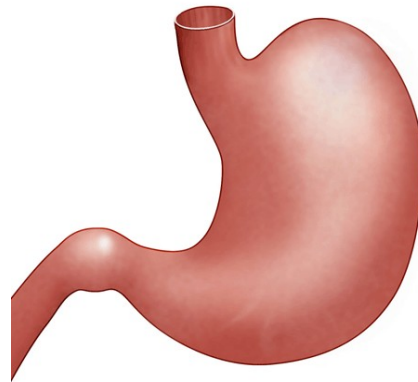
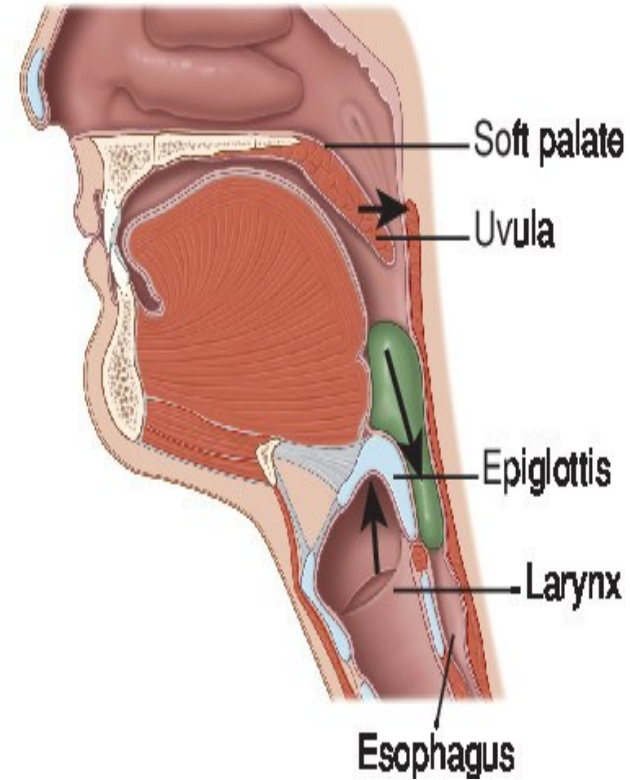
Increase the
intra-abdominal
pressure



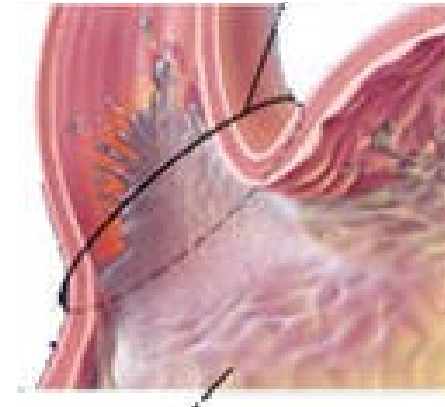
Protection of the air passages occurs similar to that during swallowing



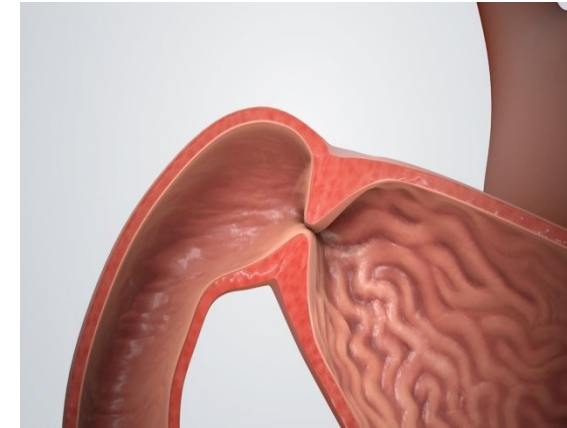
The stomach wall is completely passive



Relaxation of the wall of the stomach



Relaxation of the LES



Contraction of the pyloric sphincter



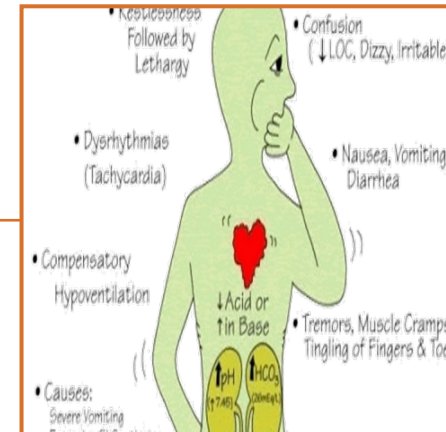
Complications of Repeated Vomiting



Dehydration



Metabolic alkalosis



Hypokalemia





Question 1

Which of the following is the major stimulus for receptive relaxation of the stomach?

- a) Food in the stomach.
- b) Food in the intestine.
- c) Secretin.
- d) Cholecystokinin (CCK).
- e) Motilin.





Question 2

Which of the following can occur without brainstem coordination?

- a) chewing.
- b) Swallowing.
- c) Primary esophageal peristalsis.
- d) Vomiting.
- e) Gastric emptying.



Question 2

Which of the following will inhibit stomach contraction?

- a) acetylcholine.
- b) Gastrin.
- c) Secretin.
- d) Motilin.
- e) Histamine.

SUGGESTED TEXTBOOKS



1. Linda S. Costanzo sixth edition from page 352 to 353.
2. Medical physiology 11th edition, Guyton & Hall from page 784 to 785.